REMARKS

The present Amendment is in response to the Office Action dated May 23, 2003 in reference to the above-identified application. The Examiner set a shortened statutory period for reply of three (3) months, making the present Amendment due by August 23, 2003. Filed concurrently herewith is a request for a two-month extension of time so that the present Amendment is due by October 23, 2003.

At the outset, the Examiner will please note that some amendments are made to independent claims 1 & 2 of the present application in order to correct certain typographical errors which appear to have resulted from the Preliminary Amendment. Notably, the Examiner will see that the word "picture" is reinserted into the claims where appropriate. These insertions do not add any new matter to the application as this was the original wording in the claims prior to the preliminary amendment. Other minor grammatical changes are also made to claim 1 as the Examiner will see. Claim 1 also now incorporates the new recitation that the second projector is different than the first projector. It is maintained that such an understanding is inherent in the original wording of claims (reciting a "first" projector and a "second" projector), but is now formally emphasized in claim 1 lest there being any disagreement. The reason for emphasizing this aspect of the present invention will become apparent from the discussion to follow.

In the Office Action, the Examiner has acknowledged receipt of Applicant's Preliminary Amendment filed on February 6, 2002, entered as Paper Mo. 5. The only substantive matter to be addressed by this response is the Examiner's rejection of pending claims 1 and 2 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,626,703 to Izawa et al. in view of U.S. Patent No. 5,982,538 to Shikama et al. The Examiner maintains that Izawa et al. teaches a stereoscopic image

display system comprising a left/right image generator for alternately generating picture signals intended for the left and right eyes. In this regard, the Examiner relies on Figures 1, 24 and 25 of Izawa et al. The Examiner then references Figure 20 of Izawa et al. for the proposition that the right eye pictures are the odd number image fields that are transmitted to a right projection device (50R), and the left eye pictures are the even numbered image fields that are transmitted to a left projection device (50L). According to the Examiner, a changeover circuit 2 (25) can be used to select the left eye or right eye image signals. Image processing then decodes the image picture signals for application to the left-eye and right-eye picture signals, with the decoder also producing vertical and horizontal scanning image signals for storage in frame memory. The Examiner maintains that it would have been obvious to one skilled in the art to modify the device of Izawa et al. by incorporating the teachings of Shikama et al., as it relates to a scanning unit for periodically scanning left and right memory frames, to generate left and right image projection signals.

Applicant respectfully disagrees with Examiner's rejection of independent claims 1 & 2 under 35 U.S.C. § 103 based on the purported combination of Izawa et al. and Shikama et al. However, before addressing the merits of the Examiner's analysis, it may be helpful first to briefly discuss the two references upon which the rejection is based.

Shikama et al ('538)

U.S. Patent No. 5,982,538 to Shikama et al. shows a projecting device where light from a light source (1) passes through a raster light valve (6) and a polarizer (7). The light valve and the polarizer are electrically controlled and shapes light from light source (1) to form picture elements to be projected on a screen (12). Thus, the actual work is done in the optical path between the light source (1) and the screen

(12). *See* Fig. 1, 2 and 3. The light valve (6) is controlled by data located in a first electronic memory bank (35) and a second electronic memory bank (36). The first memory bank (35) holds data representing left eye picture elements, while the second memory bank holds data representing right eye picture elements.

A light valve drive circuit (30) picks image data from both memory banks (35,36) to form the projected light into a sequence of two images. The valve drive circuit (6) shapes the projected light into a first image followed by a second image. The polarizer (7) is controlled by a scanning circuit (40) to polarize light differently depending on the target eye (i.e. left or right eye). A viewer (13) will see left eye image data with his left eye and right eye image data with his right eye by means of eyeglasses (14) where the left and right eye glass are differently polarized.

The straightforward solution would be to build and project a left eye image followed by a right eye image in sequence, but this would probably cause flickering. Shikama shows how the light valve drive circuit (30) and the scanning circuit (40) can be utilized to shape the projecting light into two successive images where each image partly contains left eye picture elements and partly contains right eye picture elements.

Each of the two images is a mix, or an interlace, of left eye and right eye picture elements. The first image contains odd numbered picture elements, or picture lines, from the first memory bank (35) interlaced with even numbered picture elements, or lines, from the second memory bank (36). The roles are reversed for the following, the second, image. *See* Fig. 8.

The polarizer (7) is switched between left eye and right eye polarizing modes for picture elements destined for the left eye and the right eye respectively. Each of the viewer's eyes receives light for one image in two chunks, a first half image (as in:

every odd numbered lines of a full picture) followed by a second half image (as in: every even numbered line of the same full picture). The operation is repeated for successive pairs of left eye and right eye images.

Figure 1 of Shikama et al shows the overall arrangement where the images are shaped color by color. The light is first split in three colors. Light of each color builds a monochrome polarized image, and the light forming the three images are optically combined into light carrying one full color image. The light is finally projected on the screen (12) via a lens (11). The stereoscopic effect is achieved by synchronized control/switching of the light valve (6) and the polarizing unit (7). This is what the light valve drive circuit (30) and scanning circuit (40) are used for.

Izawa et al ('703)

U.S. Patent No. 5,726,703 to Izawa el al shares some properties with the Shikama et al device. The most important being that *a single projecting device projects image data belonging to the left eye image as well as image data belonging to the right eye image.*

The Izawa device receives a stream of alternating left eye/right eye images and displays alternating left eye/right eye images using a *single* display unit. Izawa builds on prior art shown in Fig. 25 where the projecting device displays alternating left/right eye images as they appear in an incoming signal. A so called "changeover circuit" flips a polarizing unit back and forth between two polarizing modes to project left eye images with a first polarization and right eye images with a second polarization.

Izawa teaches to combine screens from multiple units to form a single screen (column 3 lines 28-34; and Fig. 20). However, despite this, each screen still alternates between displaying the left eye image and the right eye image. (see

column 3 lines 15-27). This appears to be a bit more crude than the clever, but complicated, interlacing technique in the Shakima-device.

Also, Izawa targets problems inherent in the CRT type of display. When an input signal carries 60 images per second alternating between left eye/right eye images, each eye will receive 30 images per second. This is too low a frame rate to provide a flicker free display. Izawa provides a signal doubling circuit (20) (*See* Fig. 1 and the more detailed schematics in Fig. 3). The doubling circuit (20) receives the alternating left/right eye image signal at a certain frame rate (60 frames per second), stores the image data in a memory, scans a stored left/right image pair twice utilizing a double frame rate and outputs a new image signal: left image, right image, left image, right image. Signal doubling appears to mean: receive two images during a time period, emit four images in a subsequent time period of the same duration. This is clearly shown in Figs. 3, 4a, and 4b, and it is explained at column 6, line 14, through column 7, line 10.

Receiving images as L R at one frame rate and outputting them as L R L R at a double rate means that such image output to the display unit will only last half the time period of the corresponding original frame, but as each image is displayed twice, the net result is the same. The double frame rate may make the images appear as a smooth flicker free stream. The polarizing unit (5, 6) is of course operated in sync with the frames fed to the display unit. The CPU in Fig. 3 provides the appropriate timing signal to the shutter driving circuit 34.

Izawa explains how to obtain good image quality by optimizing CRT properties like persistence (phosphorescence after-burning) and by selecting optimal optical components in the image path from the display unit (a CRT) to a screen. This

aspect need not be discussed in further detail as it appears irrelevant to the Office Action.

It is important to note that Izawa's signal doubling circuit (20) has one output. The left eye and right eye image signals leave the doubling circuit via the very same RGB lines (30), use the very same horizontal/vertical sync lines (35, 36), and utilize the very same shutter control signal (37). It is all fed to one display unit which will alternately display/project left/right eye images. It may also be worth noting that the two frame memories (26a and 26b) in Izawa Fig. 3, are not in fact used for left and right images, respectively. Rather, the two frame memories hold different properties of the same image, the Y and the Pr/Pb properties. *See* Izawa column 6 lines 27-30.

Response to 35 U.S.C. § 103 Rejection

Having discussed the cited art, it may be appreciated that there are fundamental differences between the present invention and the references relied upon by the Examiner, such that the rejection of independent claims 1 & 2 should not stand.

It should be clear that the Shikama device is a complicated projecting apparatus. The light valve (6), the light valve driving circuit (30), the polarizer (7) and the scanning circuit (40) are all involved in the image generating process. The light valve (6) and the polarizer (7) operate in the light path (between the light source (1) and a prism (8)) inside a projector, directly affecting the light forming the images. The Shikama device relies on clever handling of the optical system in one projector to modulate light to form a sequence of images having interlaced left eye and right eye image parts. The light valve driving circuit (30) and the scanning circuit (40) operate on the optical system inside the projector.

The current invention, in contrast, works with ordinary simple projectors. A projected left eye and a projected right eye image are formed using two projectors, recited in the claims as the "first projector" and the "second projector". Indeed, as now amended, independent claim 1 specifically recites that these projectors are *different*, a feature which in itself, distinguishes over the cited references. The first projector projects a left eye image through a first polarizing device while the second projector projects the corresponding right eye image through a second polarizing device. The two projected images are superimposed on a screen. The two projectors are mechanically positioned to bring the two images into registration. The polarizing devices may be simple polarizing filters.

The present invention receives a conventional image signal of the kind used by ordinary projectors, extracts left eye and right eye images from which it generates and outputs two conventional image signals, one for projecting a left eye image and one for projecting a right eye image. The invention relies on clever handling of the image signal to project left eye and right eye images using the simplest possible projecting setup, *a dedicated projector for each eye*.

The current invention receives a signal carrying alternately left/right eye images in the same way as the Izawa device. However, the left and right eye images are extracted, separated and stored in memory banks. Each stored image is scanned and converted to a display driving signal or a set of display driving signals (like RGB + sync). The output is one signal (or set of signals) for left eye images and one signal (or set of signals) for right eye images. Each signal (or set of signals) is fed to a dedicated display unit or projector.

It is submitted that the Examiner's reliance on Fig. 20 of Izawa for the proposition that it teaches first and second projectors, as recited in the claims of the

present application, is misplaced. Fig. 20 of Izawa merely relates to a multiple projection display system in which a plurality of projectors are used together to display an overall image. However, each of these projectors is not dedicated in the sense that it is responsible for producing one of a projected left eye image or right eye image. Rather, each projector in the multiple projection system contemplated by Fig. 20 of Izawa still alternates between displaying the left eye image and the right eye image. (see column 3 lines 15-27). As such, Izawa fails to teach a "first projector" and a "second projector", as recited in the claims of the application.

Moreover, and notwithstanding Izawa's failure to teach the claimed first and second projectors, it is further submitted that there would be no requisite motivation to incorporate the teachings of Shikama into the system of Izawa in the manner advanced by the Examiner. To combine the scanning unit (40) in the Shikama device with the signal doubling circuit (20) in the Izawa-device, as argued by the Examiner, will not at all produce the image signals generated by the current invention. The prior art devices both have a single display or projecting device produce alternating images on a screen. Each image is polarized according to polarized eyeglasses.

Shikama teaches how to interlace a left eye and right eye image to form a sequence of images and a way to polarize parts of an image for the left eye and other parts for the right eye. Shikama'a scanning unit (40) handles the fragmented polarization. It is not obvious how this polarization control can be utilized in the Izawa circuitry to produce the output signals of the current invention. The whole idea is in fact highly questionable.

Unlike the two prior art devices, the current invention does not need polarization control circuitry at all. The complicated polarization control unit in the

Shikama device, the scanning unit (40) that is, is not needed in the Izawa device because Izawa does not interlace left eye and right eye images. Using Shikama's polarizing control unit, the scanning unit (4), to control a different kind of polarizer could arguably be obvious to those skilled in the art. However, using the scanning unit (40) to produce an independent image signal, RGB say, for a second projector, will not even work.

No additional claims fees are believed to be payable upon the Amendment. However, the Commissioner is hereby authorized to charge any deficiency in the required fees, or to credit any overpayment, to deposit account number 13-1940.

Based on the foregoing, Applicant submits that the present application is in complete condition for allowance, and action to that end is courteously solicited. If any issues remain to be resolved prior to the granting of this application, the Examiner is requested to contact the undersigned attorney for the Applicant at the telephone number listed below.

Respectfully submitted,

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